

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

United States Patent and Trademark
Office
(Box PCT)
Crystal Plaza 2
Washington, DC 20231
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in its capacity as elected Office

Date of mailing (day/month/year) 04 December 1997 (04.12.97)	
International application No. PCT/SE97/00293	Applicant's or agent's file reference P33106PC00
International filing date (day/month/year) 21 February 1997 (21.02.97)	Priority date (day/month/year) 23 February 1996 (23.02.96)
Applicant TOMER, Shalit	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
23 September 1997 (23.09.97)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

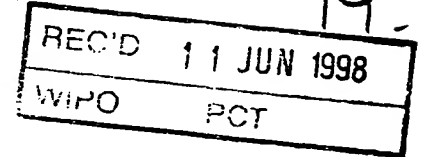
made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

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The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer N. Lindner
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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference P33106PCOO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/SE97/00293	International filing date (day/month/year) 21.02.1997	Priority date (day/month/year) 23.02.1996
International Patent Classification (IPC) or national classification and IPC ₆ G 06 K 11/18, G 06 F 3/033		
Applicant TOMER SHALIT		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
- ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 23.09.1997	Date of completion of this report 03.06.1998
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88 Telex 17978 PATOREG-S	Authorized officer Eva Jedermark Telephone No. 08-782 25 00

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE97/00293

I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

☒ the international application as originally filed.

☐ the description, pages _____, as originally filed,
 pages _____, filed with the demand,
 pages _____, filed with the letter of _____,
 pages _____, filed with the letter of _____.

☐ the claims, Nos. _____, as originally filed,
 Nos. _____, as amended under Article 19,
 Nos. _____, filed with the demand,
 Nos. _____, filed with the letter of _____,
 Nos. _____, filed with the letter of _____.

☐ the drawings, sheets/fig _____, as originally filed,
 sheets/fig _____, filed with the demand
 sheets/fig _____, filed with the letter of _____,
 sheets/fig _____, filed with the letter of _____.

2. The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/fig _____

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE97/00293

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>3, 6-8, 11, 14-16</u>	YES
	Claims	<u>1-2, 4-5, 9-10, 12-13</u>	NO
Inventive step (IS)	Claims	<u>3, 7-8, 11, 15-16</u>	YES
	Claims	<u>1-2, 4-6, 9-10, 12-14</u>	NO
Industrial applicability (IA)	Claims	<u>1-16</u>	YES
	Claims		NO

2. Citations and explanations

The claimed invention relates to a tracking device and a method for a sensory feedback to the tracking device, when a cursor hits or passes the borders of a graphical detail.

The solution according to the invention is to fix the cursor controlled by the tracking device within the borders of the graphical details, and when the cursor hits the borders, the tracking device receive a sensory feedback. It is possible to release the cursor from the fixation.

From (A) EP 0607580 A1, (B) EP 0265011 A1, (C) EP 0489469 A1 and (D) WO 9200559 A1, a tracking device and a method for marking graphical details in connection with or comprised in a program as an interface for the access of program functions comprised in the details is known, where a cursor controlled by means of the tracking device on a display receives a sensory feedback from status signals for a cursor control in a host unit, when the cursor hits or passes said graphical details in such a form that means provided in the tracking device generate a movement of the tracking device. In (C) is also known that means provided in the tracking device generate a movement of the tracking device, where a cursor being fixed in a detail can freely move within the borders of the detail (see (A) column 1 line 54 - column 2 line 9 and column 4 line 24 - line 37; see (B) column 1 line 1 - line 5 and column 1 line 45 - column 2 line 5; see (C) column 1 line 58 - column 2 line 10, column 8 line 2 - line 19 and figure 5; see (D) page 1 line 34 - page 2 line 2, page 2 line 32 - 35 and page 3 line 1 - line 5).

According to the arguments stated above, the invention claimed in claims 1 and 9 is not novel, and is not considered to involve an inventive step but comprise industrial applicability.

.../...

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE97/00293

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V

From document (C) it is known to fix the cursor and a method to fix the cursor within the borders of optional details when the cursor hits the borders or passes them. The subject matters claimed differs from the device and method described in document (C) in respect of the cursor is not mentioned to be released during a pressing-down of the casing of the tracking device.

According to the arguments stated above, the invention claimed in claims 3 and 11 is novel and considered to involve an inventive step and to comprise industrial applicability.

From document (D) is known the movements of a tracking device and a method of the movements of a tracking device consists of that it vibrates, bounces, bumps or slants (see (D) page 2 line 8 - 18 and line 24 - line 27).

From document (D) is a graphical detail and a method of a graphical detail known that can consist of an icon, a key, a window or an edge delimiting the frame as well as graphical details is known that in form of key rows are rendering different sensory feedbacks depending on the key and its function (see (D) page 2 line 8 - 18 and line 24 - line 27).

According to the arguments stated above, the invention claimed in claims 2, 4-5, 10 and 12-13 is not novel, and is not considered to involve an inventive step but comprise industrial applicability.

From (E) GB 2238215 A and (F) US 5264836 A is known a cursor and a method of a cursor that is moved within in a three-dimensional object, a cursor that provides a shadow within the object or the detail and that the shadow from the cursor allows the cursor to be moved more easily into the object or the detail. The subject matters claimed differs from the device and method described in document (E) and (F) in respect of the cursor is not being fixed in the three-dimensional object or detail and is not providing a shadow within the object or detail if drawn out of these without first being released (see (E) page 2 line 1 - line 20; see (F) column 2 line 35 - line 48).

It must be considered obvious for the man skilled in the field of data input device design to fix the cursor in a three-dimensional object or detail as well as in a two-dimensional object which is known and stated above in document (C), but it is not known to provide a shadow within the object or detail if drawn out of these without first being released.

According to the arguments stated above, the invention claimed in claims 6 and 14 is novel and comprise industrial applicability but is not considered to involve an inventive step.

.../...

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE97/00293

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V

According to the arguments stated above, the invention claimed in claims 7-8 and 15-16 is novel and considered to involve an inventive step and to comprise industrial applicability.

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REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

PCT/ SE 97 / 00293

International Application No.

International Filing Date

21 -02- 1997

The Swedish Patent Office
For International Application

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference
(if desired) (12 characters maximum)

P33106PC00

Box No. I TITLE OF INVENTION	
DISPLAY ARRANGEMENT AND METHOD	
Box No. II APPLICANT	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)	
Tomer Shalit Kemigränd 16 S-907 31 UMEÅ Sweden	<input checked="" type="checkbox"/> This person is also inventor. Telephone No. Facsimile No. Teleprinter No.
State (i.e. country) of nationality: SE	State (i.e. country) of residence: SE
This person is applicant for the purposes of: <input checked="" type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)	
This person is: <input type="checkbox"/> applicant only <input type="checkbox"/> applicant and inventor <input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)	
State (i.e. country) of nationality:	State (i.e. country) of residence:
This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
<input type="checkbox"/> Further applicants and/or (further) inventors are indicated on a continuation sheet.	
Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE	
The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: <input checked="" type="checkbox"/> agent <input type="checkbox"/> common representative	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)	
AB STOCKHOLMS PATENTBYRÅ, Zacco & Bruhn (publ), ONN, Thorsten; AGVALD-GLAS, Gunilla; BERNHULT, Lennart; HANSSON, Sven; KARLSTRÖM, Lennart; PETRÉ, Urban; WESTERLUND, Örjan Box 23101, S-104 35 STOCKHOLM, Sweden	Telephone No. 08-7299500 Facsimile No. 08-318315 Teleprinter No. 17214 ZACCON
<input type="checkbox"/> Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.	

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes: at least one must be marked):

Regional Patent

- ☒ AP ARIPO Patent: KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SZ Swaziland, UG Uganda, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- | | |
|--|--|
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| <input checked="" type="checkbox"/> AM Armenia | <input checked="" type="checkbox"/> LV Latvia |
| <input checked="" type="checkbox"/> AT Austria | <input checked="" type="checkbox"/> MD Republic of Moldova |
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| <input checked="" type="checkbox"/> AZ Azerbaijan | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia |
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| <input checked="" type="checkbox"/> BY Belarus | <input checked="" type="checkbox"/> NZ New Zealand |
| <input checked="" type="checkbox"/> CA Canada | <input checked="" type="checkbox"/> PL Poland |
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| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea | |
| <input checked="" type="checkbox"/> KR Republic of Korea | |
| <input checked="" type="checkbox"/> KZ Kazakhstan | |
| <input checked="" type="checkbox"/> LC Saint Lucia | |
| <input checked="" type="checkbox"/> LK Sri Lanka | |
| <input checked="" type="checkbox"/> LR Liberia | |
| <input checked="" type="checkbox"/> LS Lesotho | |
| <input checked="" type="checkbox"/> LT Lithuania | |

Check-boxes reserved for designating States (for the purposes of a national patent) which have become party to the PCT after issuance of this sheet:

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<input type="checkbox"/>

In addition to the designations made above, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except the designation(s) of
 The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

Box No. VI PRIORITY CLAIM		Further priority claims are indicated in the Supplemental Box <input type="checkbox"/>	
The priority of the following earlier application(s) is hereby claimed:			
Country (in which, or for which, the application was filed)	Filing Date (day/month/year)	Application No.	Office of filing (only for regional or international application)
item (1) Sweden	23 FEBRUARY 1996	9600686-1	
item (2)			
item (3)			

Mark the following check-box if the certified copy of the earlier application is to be issued by the Office which for the purposes of the present international application is the receiving Office (a fee may be required):

☒ The receiving Office is hereby requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s): 9600686-1

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) (If two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen: the two-letter code may be used): ISA / SE

Earlier search Fill in where a search (international, international-type or other) by the International Searching Authority has already been carried out or requested and the Authority is now requested to base the international search, to the extent possible, on the results of that earlier search. Identify such search or request either by reference to the relevant application (or the translation thereof) or by reference to the search request:

Country (or regional Office): _____ Date (day/month/year): _____ Number: _____

Box No. VIII CHECK LIST

This international application contains the following number of sheets:

1. request : 37 sheets ✓

2. description : 7 sheets ✓

3. claims : 2 sheets ✓

4. abstract : 1 sheet ✓

5. drawings : 4 sheets ✓

Total : 17 sheets ✓

This international application is accompanied by the item(s) marked below:

1. <input type="checkbox"/> separate signed power of attorney	5. <input checked="" type="checkbox"/> fee calculation sheet
2. <input type="checkbox"/> copy of general power of attorney	6. <input type="checkbox"/> separate indications concerning deposited microorganisms
3. <input type="checkbox"/> statement explaining lack of signature	7. <input type="checkbox"/> nucleotide and/or amino acid sequence listing (diskette)
4. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s):	8. <input type="checkbox"/> other (specify):

Figure No. 1 of the drawings (if any) should accompany the abstract when it is published.

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

Sven A. Hansson

Sven A. Hansson
Representative of the applicant

For receiving Office use only		2. Drawings: <input checked="" type="checkbox"/> received: <input type="checkbox"/> not received:
1. Date of actual receipt of the purported international application:	21 -02- 1997	
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:		
4. Date of timely receipt of the required corrections under PCT Article 11(2):		
5. International Searching Authority specified by the applicant: <u>ISA / SE</u>	6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid	

For International Bureau use only	
Date of receipt of the record copy by the International Bureau:	17 MAR 1997 (17.03.97)

Form PCT/RO/101 (last sheet) (January 1994; reprint January 1997) See Notes to the request form

Anordning och förfarande vid display

Display arrangement and method

Föreliggande uppfinning hänför sig till ett pekdon och ett förfarande för sensorisk
5 återkoppling från markörstatus för en markör då grafiska detaljer i anslutning till eller
innefattade i programvara påträffas eller passeras. Mera specifikt anger uppfinningen att
en signal för sensorisk återkoppling genereras, som alstrar en rörelse av pekdonet.

Teknikens ståndpunkt

Användargränssnitt i form av fönster (Windows ®) som hjälpmedel för åtkomst
10 till specifika programfunktioner i datorprogram återfinnes i så gott som alla moderna
användargränssnitt. Programvara som bygger på användning av fönster innefattar även
funktionsknappar i t ex knapprader, skärm- eller displayavgränsningar och ikoner, s k
grafiska symboler.

För att erhålla tillgång till de funktioner som innefattas i symbolerna styrs en
15 markör (cursor) med hjälp av ett pekdon (datormus, styrkula - "trackball"-, pekpenna etc)
över en displayenhet som visar symbolerna, varvid symbolens innefattade funktion
framkallas genom att t ex en tangent på pekdonet påverkas med ett eller flera tillslag.

Ett problem med styrning av markören för att påverka symbolerna uppkommer i
det att det är svårt att fixera markören till symbolen på ett distinkt sätt för att tillslagen
20 skall ge önskad effekt.

Det är lättare att träffa t ex knappar, som befinner sig vid kanten av en display än
mitt i den. För att träffa en knapp vid kanten dras datormusen snabbt åt rätt håll för att
hamna på knappen. Det har ingen betydelse om datormusen dras för långt. Markören
stannar ändå vid kanten. För att träffa en knapp som befinner sig t ex mitt på display-
25 bildrutan krävs det däremot mer koordination av en datormusanvändare för att träffa rätt,
exempelvis måste användaren bromsa pekdonet innan knappen nås för att markören skall
hamna på knappen. Momentet tar tid och kan vara svårt samt även skapa stress och
irritation hos användaren.

Ytterligare ett problem förknippat med användning av pekdon för nämnda ända-
30 mål är att användaren önskar simultanförmåga, d v s t ex snabbt kunna lokalisera
knappen för sparfunktionen i ett program, utan att för den skull behöva låta blicken svepa
över displayenheten.

Ur den Europeiska patentansökningen EP, A1, 0 607 580 är en datormus med

stav beskriven, som från en datorvärdenhet erhåller signaler som påverkar staven, vilken stav avger sensoriska signaler till en användares fingerspets t ex när status för markören ändras.

Uppfinningen enligt nämnda EP-ansökan är dock inte problemfri i det att en fingerspets måste hållas intill staven. Vid ergonomiska studier har det visat sig att en datormusanvändare vid kontinuerlig användning av datormusen svårtligen kan hålla fingerspetsar över samma punkt en längre tid. Detta kan på ett naturligt sätt förstås av gemene man, i det att en del användare har lätt att få kramp, skrivkramp är en känd åkomma. Dessutom lider en del människor av lättare eller svårare tremor. Datormusen med stav är således begränsad i sin användning för en inte försumbar del av pekdonanvändare.

Sammanfattning av uppfinningen

Föreliggande uppfinning avser att lösa ovanstående problem förknippade med fönsteranvändargränssnitt och liknande på ett nytt och innovativt sätt.

För att uppnå sagda ändamål med uppfinningen anger den ett pekdon för markering av grafiska detaljer i anslutning till eller innefattade i programvara, som användargränssnitt för åtkomst av i detaljerna innefattade programfunktioner.

En markör som pekdonet styr på en display erhåller en sensorisk återkoppling från statussignaler för en markörhanterare i en värdenhet, då markören påträffar eller passerar nämnda grafiska detaljer, i form av att organ anordnade i pekdonet alstrar en rörelse av pekdonet.

Pekdonets rörelse består i att det vibrerar, hoppar, guppar eller lutar.

Markören kan fixeras inom valfria detaljers, även tredimensionella, avgränsning då markören påträffar avgränsningen eller passerar den, och varvid markören frigörs vid nedtryckning av pekdonets hölje.

En grafisk detalj kan vara en ikon, en knapp, ett fönster eller en kant som avgränsar bildrutan.

Alternativt ger grafiska detaljer i form av knapprader olika sensorisk återkoppling beroende på knapp och dess funktion.

I ännu ett alternativ är markören som fixerats i en detalj fritt rörlig inom detaljens avgränsning.

Markören, när den har fixerats i ett tredimensionellt objekt eller detalj, kan vara fritt rörlig inom objektets eller detaljens volym i en utföringsform, varvid markören även

kan lämna en skugga inom objektet eller detaljen om den dras ut ur dessa utan att först ha frigjorts. Skuggan medger att markören lättare kan föras in i objektet eller detaljen.

Uppfinningen inbegriper även ett förfarande för markering av grafiska detaljer med ett pekdon.

5 Kortfattad beskrivning av ritningsfiguren

Nedan beskrivs uppfinningen mer detaljerat med hänvisning till bilagda ritningsfigurer, där:

Fig. 1 schematiskt illustrerar ett pekdon i form av en datormus ansluten till en datorvärdenhet med display, vilken visar grafiska detaljer och en sensorisk återkoppling
10 till datormusen enligt uppfinningen.

Fig. 2 schematiskt illustrerar en alternativ sensorisk återkoppling i ett pekdon enligt fig. 1.

Fig. 3 schematiskt illustrerar en nedtryckning av pekdonet enligt fig. 1 i en utföringsform av uppfinningen.

15 Fig. 4 schematiskt i en sprängskiss av en datormus illustrerar en utföringsform av hur ett organ kan anordnas i datormusen för att åstadkomma rörelse av datormusen.

Fig. 5 schematiskt illustrerar hur en markör med skugga visas när en användare av markören rör ett pekdon i en tredimensionell virtuell omgivning enligt en utföringsform av föreliggande uppfinning.

20 Detaljerad beskrivning av föredragna utföringsformer

Föreliggande uppfinning beskrivs nu närmare med alternativa utföringsformer, som belyser tekniken för uppfinningen, och de kognitiva, taktila och motoriska fördelar som ett pekdon enligt uppfinningen frambringar.

I fig. 1 illustreras schematiskt en datormus 10, som är ansluten till en värdenhet
25 12 i form av en dator, här en PC, med en displayenhet 14 och ett tangentbord 16.

Även om föreliggande uppfinning i sina utföringsformer specifikt beskriver en datormus 10, är uppfinningen generellt applicerbar på de flesta kända pekdon såsom styrkuler ("trackballs") för portabla datorer, pekpennor etc.

Datormusen 10 består i stort av ett i förhållande till en bottendel 18 rörligt hölje
30 20 samt de konventionella funktionsknapparna 22, 24. Vidare är datormusen ansluten med en värdenhet 12, 14, 16 genom en signalkabel 26 innefattande signallednigar för en styrkulas x- och y-ledsriktningsgivare, ej visade. Dessutom innefattar signalkabeln ledningar för överföring av statussignaler för skärmmarkören 28 (cursorn) från en

markörhanterare innefattad i värdenheten 12, 14.

Displayen 14 visar i sin bildruta 30 schematiskt hur ett användargränssnitt i en fönstermiljö kan te sig. Bildrutan 30 visar förutom skärmmarkören 28 ett fönster 32, en ikon 34, en skärmkant 36, en knapprad med tre knappar 40, 42, 44 och tre fält 38 med 5 speciella attribut, vilka inte närmare beskrivs.

När markören 28 via datormusen 10 förs mot eller över en grafisk detaljs avgränsning (periferi) 32, 34, 36, 40, 42, 44 genererar värdenheten 12, 14, i en utföringsform av uppfinningen, via markörhanterarens status (x- och y-koordinat, statusflaggor etc) för markören 28 en sensorisk återkoppling i form av en signal via signalledningar i kabeln 10 26. Signalen åstadkommer att ett organ som applicerats i datormusen 10 genererar en rörelse av datormusen 10, t ex i form av att datormusen 10 vibrerar, hoppar, guppar, lutar etc.

I en alternativ utföringsform fixeras även markören 28 inuti avgränsningen, dock företrädesvis så att den är fritt rörlig mellan avgränsningar, exempelvis såsom mellan 15 avgränsningarna 32 och 34 för fönstret resp ikonerna, om den har fixerats i fönstret.

Vid fixering av markören 28 inom en grafisk detalj initierar statusregistret för markören 28, att en signal avges till datormusen 10 vars hölje 20 erhåller en sensorisk återkoppling av att markören 28 har fixerats i eller emot en grafisk detalj 32, 34, 36, 40, 42, 44. I föreliggande utföringsform vibrerar 46 höljet 20 i förhållande till bottendelen 18. 20 Eventuellt kan hela datormusen vibrera i fall av en utföringsform utan specifikt hölje och specifik bottendel. Istället för att vibrera kan ett pekdon 10 hoppa eller guppa varje gång markören förs mot eller fixeras mot en grafisk detalj.

Vibrationerna kan åstadkommas med organ såsom elektromagneter, piezoelektriska givare, bimetaller och andra på marknaden förekommande organ som kan åstadkomma 25 vibrationer.

Ytterligare, i en utföringsform kan den grafiska detalj som markören 28 fixerats i identifieras via vibrationsfrekvensen. Det är i de allra flesta fall fullt tillräckligt att ett fåtal grafiska detaljer är önskvärda att identifiera med vibrationsfrekvensen, t ex sparknappen, här med beteckningen 40, så att en simultaneffekt erhålls i det att när t ex ett 30 program eller en datafil skall sparas. Detta sker utan att användaren nödvändigtvis behöver flacka eller svepa med blicken över bildrutan 30 för att hitta sparknappen 40. I princip kan dock de flesta grafiska detaljer erhålla en specifik kod via vibrationsfrekvensen.

Eftersom markören 28 har fixerats inom en avgränsning måste den kunna tas ur

fixeringen. Enligt en utföringsform i föreliggande uppfinning sker detta genom att datormusen 10 eller annat använt pekdon utsätts för ett tryck nedåt som påverkar en signalgivare, t ex en tryckgivare, att ändra status för markören 28, varvid användaren upplever det som denne trycker ut markören eller går under kanten av en avgränsning, vilket förbättrar perceptionen av skeendet på bildrutan 30.

Genom att känna när markören glider över t ex en knapp 40 så förtydligas bilden av knappen 40. På liknande sätt förstärks bilden av ett fönster 32.

En parallell till föreliggande uppfinning är införandet av skuggor i grafiska gränssnitt. I och med att användaren kan se skuggan av ett gränssnitt som t ex ett fönster, blir det mycket enklare att förstå ett koncept med flera lager av fönster, d v s fönster som ligger överlappade. Detta ger en ökad tredimensionell effekt och förbättrar den estetiska aspekten och ger även en förbättring av användarens perception av gränssnittet, vilket gör det effektivare. Föreliggande uppfinning tillför liknande egenskaper, därav parallellen.

I fig. 2 visas en annan utföringsform av en sensorisk återkoppling enligt uppfinningen.

Fig. 2 visar schematiskt datormusen 10, varvid det i förhållande till bottendelen 18 rörliga höljet 20 är snedställt åt höger i figuren, markerat av en nedåt riktad pil, som en sensorisk återkoppling från statusregistret för markören 28. Snedställningen kan även åstadkommas framåt, bakåt, åt vänster etc. Således anger resp snedställning en kod. Snedställningen åt höger kan exempelvis betyda knappen för sparfunktionen 40. Likaledes kan övriga snedställningar indikera koden för en annan grafisk detalj 32, 34, 36, 40, 42, 44. Dessutom kan alternerande snedställningar för en återkoppling ange ytterligare koder.

Organ för snedställning av datormusen 10 kan bestå av elektromagneter, relän etc.

För att gå ur en fixering inom en grafisk detaljs avgränsning eller periferi illustreras schematiskt i fig. 3 hur datormusens 10 hölje trycks mot bottendelen 18, varvid exempelvis en tryckgivare alstrar en signal till markören 28 att lämna en avgränsning där den tidigare har fixerats. Som tidigare påtalats kan en datormus 10, där höljet 20 och bottendelen bildar en enhet med varandra, även den via en lämplig placering förses med en tryckgivare för att åstadkomma signaler som frigör markören 28.

Vad beträffar anordnande av organ som är ämnade att alstra den sensoriska återkopplingen i ett pekdon tillhör det per se mer fackmannamässiga konstruktionsåtgärder, men med hänvisning till fig. 4 exemplifieras en utföringsform av hur ett sådant

organ kan anordnas i en datormus 10.

I fig. 4 illustreras hur en elektromagnet 50 via skruvar anordnas i en fästanoordning 52, som här skruvas fast i datormusens 10 bottenplatta 18. Mellan höljet 20 och bottendelen 18 anordnas ett fjädrande organ 56. När datormusen 10 erhåller den sensoriska återkopplingssignalen slår ankaret 58 på elektromagneten 50 an mot höljet 20, vilket alstrar en rörelse i höljet 20. Rörelsen övergår i en vibration via den i det fjädrande organet 56 lagrade lägesenergin. För att åstadkomma kodning av den sensoriska återkopplingen såsom beskrivits ovan, kan kända organ som genererar pulståg användas.

Ytterligare löser föreliggande uppfinning de problem som är behäftade med den sensoriska återkopplingen via en stav, beskriven i EP, A1, 0 607 580, i det att musen i sig vibrerar, vilket gör det lättare för användare med krampbenägenhet och tremor att använda datormusen 10. Dessa behöver i princip inte vidröra datormusen med någon specifik handsättning, eftersom hela datormusen fås att röra sig enligt uppfinningen.

I fig. 5 illustreras schematiskt hur en markör med skugga visas när en användare av markören rör ett pekdon i en tredimensionell virtuell omgivning 60, t ex ett rum, enligt en utföringsform av föreliggande uppfinning.

Pekdonet 10 förs till ett önskat virtuellt objekt 62 i form av en tredimensionell volym, utan att objektet 62 är synligt i rummet. Däremot kan den markör 28 som pekaren styr följas på ett displayorgan, som avgränsas av den heldragna linjen 64. Displayorganet behöver inte nödvändigtvis vara en datorskärm 30, utan kan vara en annan form av bildåtergivare t ex en spegel.

Objektet 62 är synligt för en användare på displayorganet som avgränsas av linjen 64 i fig. 5, d v s inte virtuellt som omgivningen 60.

Vidare har markören 28 en skugga 66 på displayorganet 64, vilken stannar kvar inom objektet 62 då markören dras ut ur objektet om inte pekdonet 10 frigörs genom t ex nedtryckning. På så vis hittar en användare av pekdonet i den virtuella omgivningen lättare tillbaka till objektet 62 efter t ex en paus eller annan utgång ur objektets 62 rymd. Markören 28 integreras då med skuggan när den befinner sig i objektet 62.

Ovanstående är exempelvis användbart i CAD-program såsom ALIAS ®, vilket bl a används inom bilindustrin för design av produkter, då det är problematiskt att avgöra vart i rymdens 62 djup som markören 28 befinner sig. Det bör även beaktas att den virtuella rymden 60 kan innefatta massor av rymdobjekt 62 i olika geometriska former varför nyttan av skuggan 66 blir uppenbar.

Ett rymdobjekts 62 djup definieras t ex av något koordinatsystem 68 i tre dimensioner såsom t ex ett kartesiskt, polärt etc.

Ett annat tänkbart område för användning av ovanstående utföringsform av markören 28 med skugga 66 är inom kirurgin, exempelvis för träning av kirurgaspiranter
5 eller mer avancerad kirurgi vid mer eller mindre komplicerade operationer.

Konventionellt består en tredimensionell- eller perspektivbild i programvara som framställer trådmodeller av objekt 62, vilka saknar innefattad rymd. Rymden kan räknas fram i realtid när en yta passeras i objektet 62. En yta i objektet 62 definieras då av polygoner (ej visade) som räknas (renderas) fram i realtid varvid nödvändig yta för att
10 skapa djup erhålles.

Föreliggande uppfinning har beskrivits med föredragna utföringsformer, vilka inte är menade att begränsa uppfinningen. Det är patentkravens avfattning som definierar uppfinningen för en fackman på teknikområdet.

Patentkrav

1. Pekdon för markering av grafiska detaljer (32, 34, 36, 40, 42, 44) i anslutning med eller innefattade i programvara som användargränssnitt för åtkomst av i detaljerna innefattade programfunktioner, k ä n n e t e c k n a t av att en markör (28) som
5 pekdonet (10) styr på en display erhåller en sensorisk återkoppling från statussignaler för en markörhanterare i en värdenhet (12, 14, 30), då markören påträffar eller passerar nämnda grafiska detaljer (32, 34, 36, 40, 42, 44), i form av att organ (50) anordnade i pekdonet (10) alstrar en rörelse (46) av pekdonet (10), varvid en markör (28) som fixerats i en detalj är fritt rörlig inom detaljens avgränsning (32, 34, 36, 40, 42, 44).
- 10 2. Pekdon enligt krav 1, k ä n n e t e c k n a t av att pekdonets rörelse består i att det vibrerar, hoppar, guppar eller lutar.
3. Pekdon enligt krav 1-2, k ä n n e t e c k n a t av att markören kan fixeras inom valfria detaljers avgränsning (32, 34, 36, 40, 42, 44) då markören (28) påträffar avgränsningen eller passerar den, och varvid markören frigörs vid nedtryckning av pek-
15 donets hölje (20).
4. Pekdon enligt krav 1-3, k ä n n e t e c k n a t av att en grafisk detalj kan vara en ikon (34), en knapp (40, 42, 44), ett fönster (32) eller en kant (36) som avgränsar bildrutan (30).
5. Pekdon enligt krav 1-4, k ä n n e t e c k n a t av att grafiska detaljer i
20 form av knapprader ger olika sensorisk återkoppling beroende på knapp och dess funktion.
6. Pekdon enligt krav 1-5, k ä n n e t e c k n a d av att markören (28) när den har fixerats i ett tredimensionellt objekt eller detalj är fritt rörlig inom objektets eller detaljens volym.
7. Pekdon enligt krav 3-5, k ä n n e t e c k n a d av att markören (28)
25 lämnar en skugga inom objektet eller detaljen om den dras ut ur dessa utan att först ha frigjorts.
8. Pekdon enligt krav 7, k ä n n e t e c k n a d av att skuggan medger att markören lättare kan föras in i objektet eller detaljen.
9. Förfarande för markering av grafiska detaljer (32, 34, 36, 40, 42, 44) i anslut-
30 ning med eller innefattade i programvara som användargränssnitt för åtkomst av i detaljerna innefattade programfunktioner, k ä n n e t e c k n a t av att en markör (28) som ett pekdon (10) styr på en display erhåller en sensorisk återkoppling från statussignaler för en markörhanterare i en värdenhet (12, 14, 30), då markören påträffar eller

passerar nämnda grafiska detaljer (32, 34, 36, 40, 42, 44), i form av att organ (50) anordnade i pekdonet (10) alstrar en rörelse (46) pekdonet (10), varvid en markör (28) som fixerats i en detalj är fritt rörlig inom detaljens avgränsning (32, 34, 36, 40, 42, 44).

10 5 10. Förfarande enligt krav 9, k ä n n e t e c k n a t av att pekdonets rörelse består i att det vibrerar, hoppar, guppar eller lutar.

11. Förfarande enligt krav 9-10, k ä n n e t e c k n a t av att markören kan fixeras inom valfria detaljers avgränsning (32, 34, 36, 40, 42, 44) då markören (28) påträffar avgränsningen eller passerar den, och varvid markören frigörs vid nedtryckning av pekdonets hölje (20).

10 12. Förfarande enligt krav 9-11, k ä n n e t e c k n a t av att en grafisk detalj kan vara en ikon (34), en knapp (40, 42, 44), ett fönster (32) eller en kant (36) som avgränsar bildrutan (30).

15 13. Förfarande enligt krav 9-12, k ä n n e t e c k n a t av att grafiska detaljer i form av knapprader ger olika sensorisk återkoppling beroende på knapp och dess funktion.

14. Förfarande enligt krav 9-13, k ä n n e t e c k n a t av att markören (28) när den har fixerats i ett tredimensionellt objekt eller detalj är fritt rörlig inom objektets eller detaljens volym.

20 15. Förfarande enligt krav 11-14, k ä n n e t e c k n a t av att markören (28) lämnar en skugga inom objektet eller detaljen om den dras ut ur dessa utan att först ha frigjorts.

16. Förfarande enligt krav 15, k ä n n e t e c k n a t av att skuggan medger att markören lättare kan föras in i objektet eller detaljen.

Sammandrag

Uppfinningen avser ett pekdon (10) och ett förfarande för sensorisk återkoppling till pekdonet (10) när en markör (28) påträffar eller passerar en grafisk detaljs avgränsning (32, 34, 36, 40, 42, 44). I en alternativ utföringsform för markering av grafiska detaljer
5 (32, 34, 36, 40, 42, 44) åstadkoms att en markör (28) som pekdonet (10) styr på en display (14, 30) fixeras inom nämnda detaljers avgränsning (32, 34, 36, 40, 42, 44) då markören (28) påträffar avgränsningen, varvid pekdonet (10) erhåller en sensorisk återkoppling (46). I en utföringsform anges hur markören (28) frigörs ur fixeringen. Speciellt frambringar uppfinningen kognitiva, taktila och motoriska fördelar för användaren av s k
10 fönsteranvändargränssnitt med knapprader (40, 42, 44) och ikoner (34).
(fig. 1)

11-04-1997

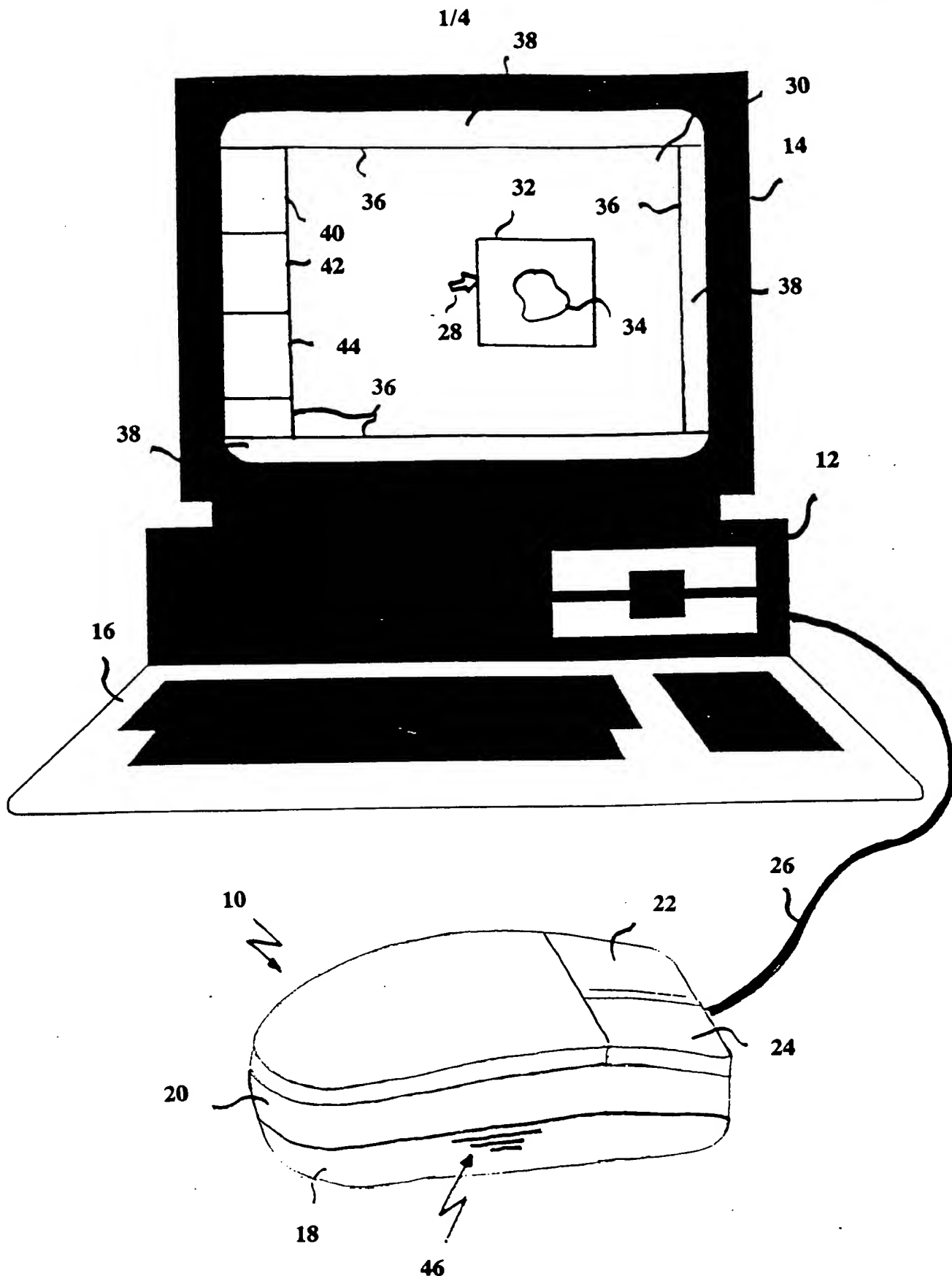


Fig. 1

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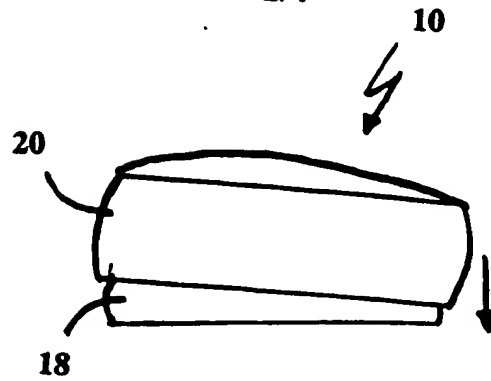


Fig. 2

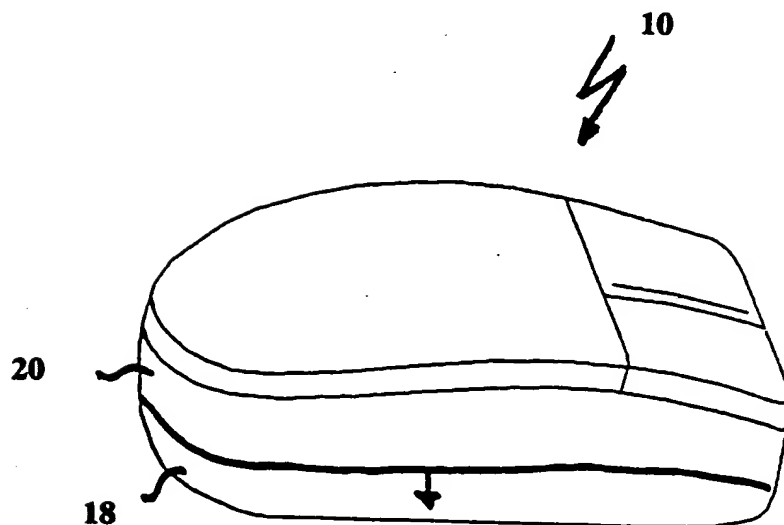


Fig. 3

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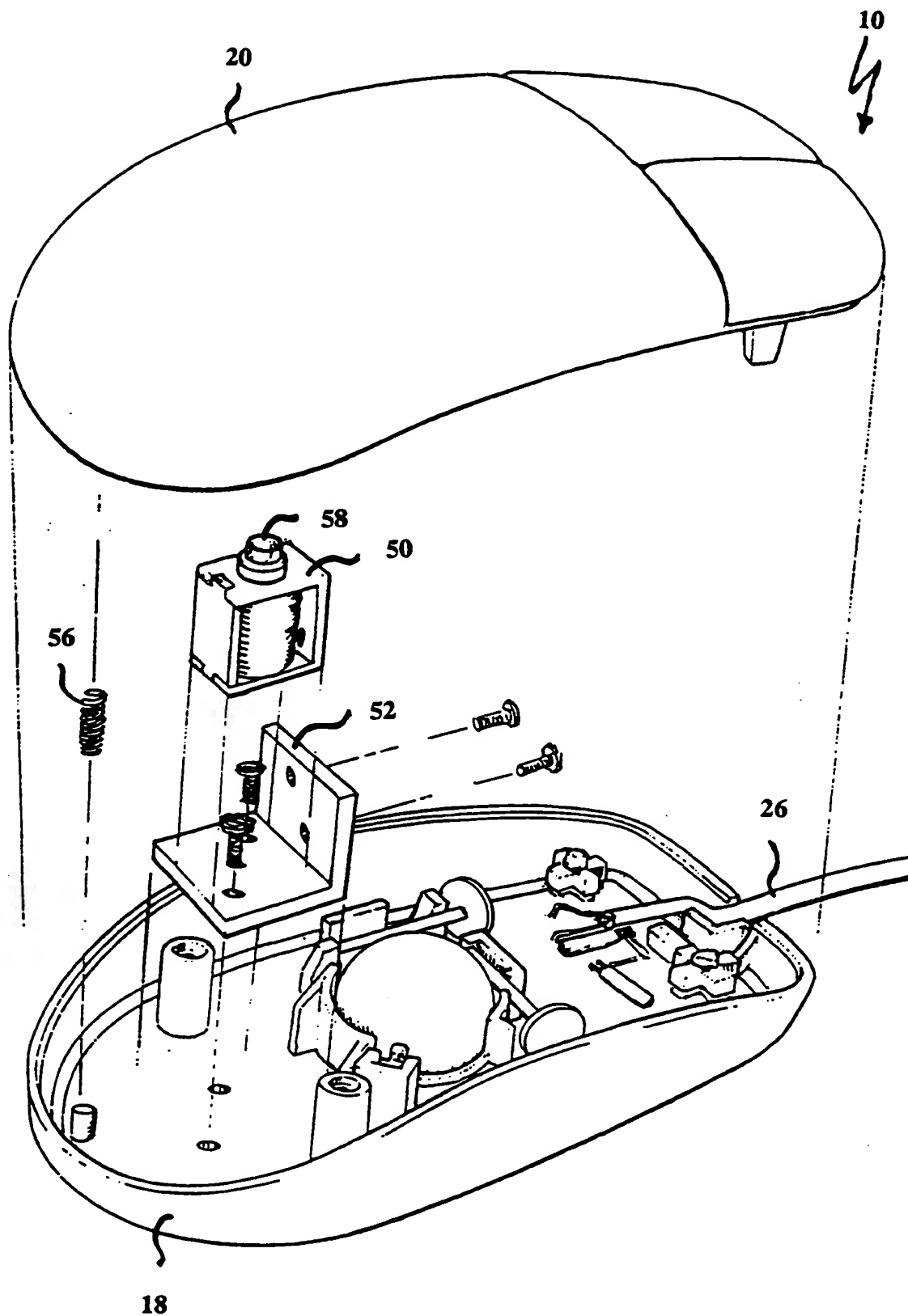


Fig. 4

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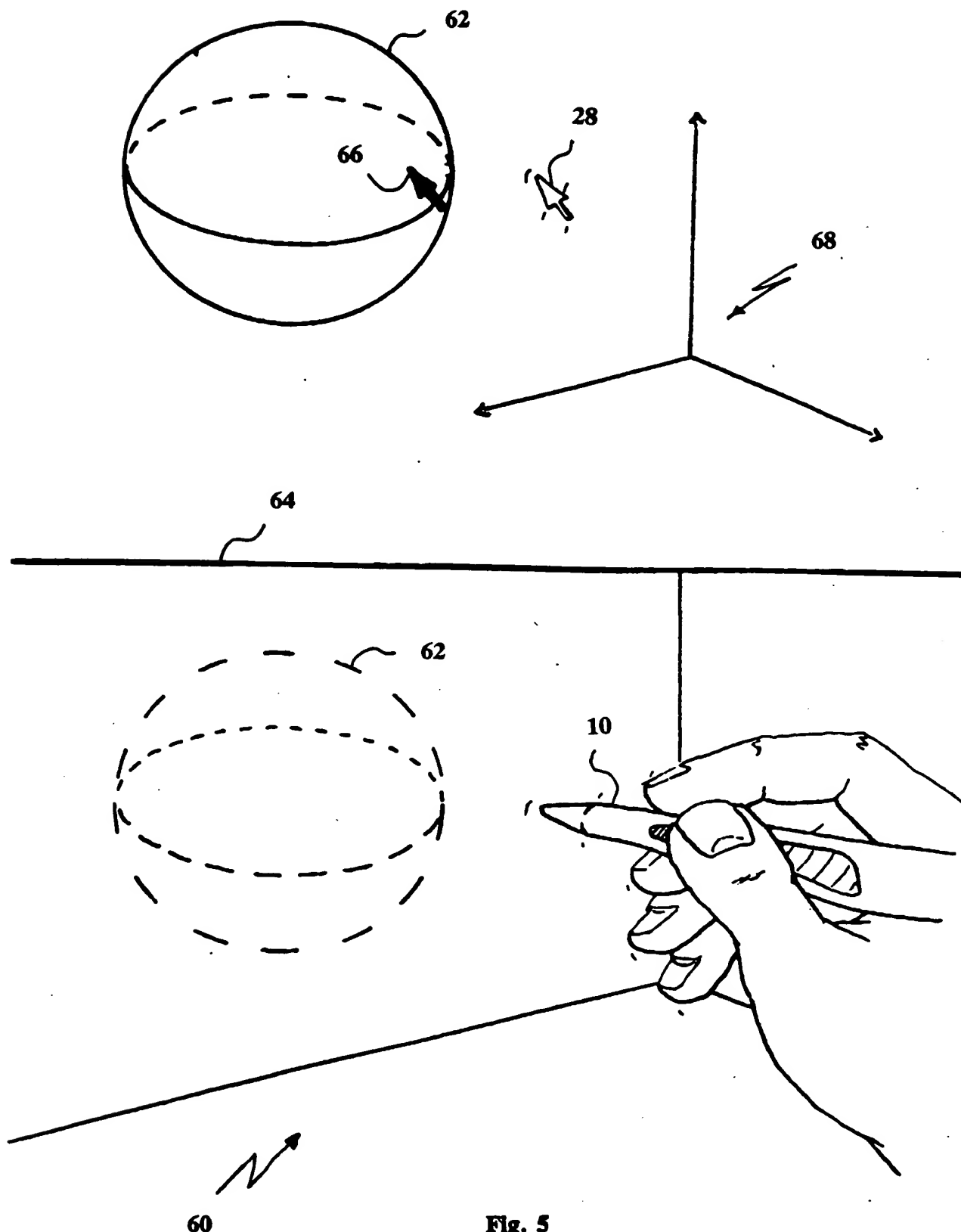


Fig. 5

PATENT COOPERATION TREATY
PCT
INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P33106PCOO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/SE97/00293	International filing date (day/month/year) 21.02.1997	Priority date (day/month/year) 23.02.1996
International Patent Classification (IPC) or national classification and IPC ₆ G 06 K 11/18, G 06 F 3/033		
Applicant TOMER SHALIT		

- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 5 sheets, including this cover sheet.
☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
These annexes consist of a total of _____ sheets.

- This report contains indications relating to the following items:
 - I ☒ Basis of the report
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 23.09.1997	Date of completion of this report 03.06.1998
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer Eva Jedermark Telephone No. 08-782 25 00

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE97/00293

I Basis of the report

1. This report has been drawn on the basis of (Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments):

- ☒ the international application as originally filed.
- ☐ the description, pages _____, as originally filed,
 pages _____, filed with the demand,
 pages _____, filed with the letter of _____,
 pages _____, filed with the letter of _____.
- ☐ the claims, Nos. _____, as originally filed,
 Nos. _____, as amended under Article 19,
 Nos. _____, filed with the demand,
 Nos. _____, filed with the letter of _____,
 Nos. _____, filed with the letter of _____.
- ☐ the drawings, sheets/fig _____, as originally filed,
 sheets/fig _____, filed with the demand
 sheets/fig _____, filed with the letter of _____,
 sheets/fig _____, filed with the letter of _____.

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig _____

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No

PCT/SE97/00293

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims	<u>3, 6-8, 11, 14-16</u>	YES
	Claims	<u>1-2, 4-5, 9-10, 12-13</u>	NO
Inventive step (IS)	Claims	<u>3, 7-8, 11, 15-16</u>	YES
	Claims	<u>1-2, 4-6, 9-10, 12-14</u>	NO
Industrial applicability (IA)	Claims	<u>1-16</u>	YES
	Claims		NO

2. Citations and explanations

The claimed invention relates to a tracking device and a method for a sensory feedback to the tracking device, when a cursor hits or passes the borders of a graphical detail.

The solution according to the invention is to fix the cursor controlled by the tracking device within the borders of the graphical details, and when the cursor hits the borders, the tracking device receive a sensory feedback. It is possible to release the cursor from the fixation.

From (A) EP 0607580 A1, (B) EP 0265011 A1, (C) EP 0489469 A1 and (D) WO 9200559 A1, a tracking device and a method for marking graphical details in connection with or comprised in a program as an interface for the access of program functions comprised in the details is known, where a cursor controlled by means of the tracking device on a display receives a sensory feedback from status signals for a cursor control in a host unit, when the cursor hits or passes said graphical details in such a form that means provided in the tracking device generate a movement of the tracking device. In (C) is also known that means provided in the tracking device generate a movement of the tracking device, where a cursor being fixed in a detail can freely move within the borders of the detail (see (A) column 1 line 54 - column 2 line 9 and column 4 line 24 - line 37; see (B) column 1 line 1 - line 5 and column 1 line 45 - column 2 line 5; see (C) column 1 line 58 - column 2 line 10, column 8 line 2 - line 19 and figure 5; see (D) page 1 line 34 - page 2 line 2, page 2 line 32 - 35 and page 3 line 1 - line 5).

According to the arguments stated above, the invention claimed in claims 1 and 9 is not novel, and is not considered to involve an inventive step but comprise industrial applicability.

.../...

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE97/00293

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V

From document (C) it is known to fix the cursor and a method to fix the cursor within the borders of optional details when the cursor hits the borders or passes them. The subject matters claimed differs from the device and method described in document (C) in respect of the cursor is not mentioned to be released during a pressing-down of the casing of the tracking device.

According to the arguments stated above, the invention claimed in claims 3 and 11 is novel and considered to involve an inventive step and to comprise industrial applicability.

From document (D) is known the movements of a tracking device and a method of the movements of a tracking device consists of that it vibrates, bounces, bumps or slants (see (D) page 2 line 8 - 18 and line 24 - line 27).

From document (D) is a graphical detail and a method of a graphical detail known that can consist of an icon, a key, a window or an edge delimiting the frame as well as graphical details is known that in form of key rows are rendering different sensory feedbacks depending on the key and its function (see (D) page 2 line 8 - 18 and line 24 - line 27).

According to the arguments stated above, the invention claimed in claims 2, 4-5, 10 and 12-13 is not novel, and is not considered to involve an inventive step but comprise industrial applicability.

From (E) GB 2238215 A and (F) US 5264836 A is known a cursor and a method of a cursor that is moved within in a three-dimensional object, a cursor that provides a shadow within the object or the detail and that the shadow from the cursor allows the cursor to be moved more easily into the object or the detail. The subject matters claimed differs from the device and method described in document (E) and (F) in respect of the cursor is not being fixed in the three-dimensional object or detail and is not providing a shadow within the object or detail if drawn out of these without first being released (see (E) page 2 line 1 - line 20; see (F) column 2 line 35 - line 48).

It must be considered obvious for the man skilled in the field of data input device design to fix the cursor in a three-dimensional object or detail as well as in a two-dimensional object which is known and stated above in document (C), but it is not known to provide a shadow within the object or detail if drawn out of these without first being released.

According to the arguments stated above, the invention claimed in claims 6 and 14 is novel and comprise industrial applicability but is not considered to involve an inventive step.

.../...

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE97/00293

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V

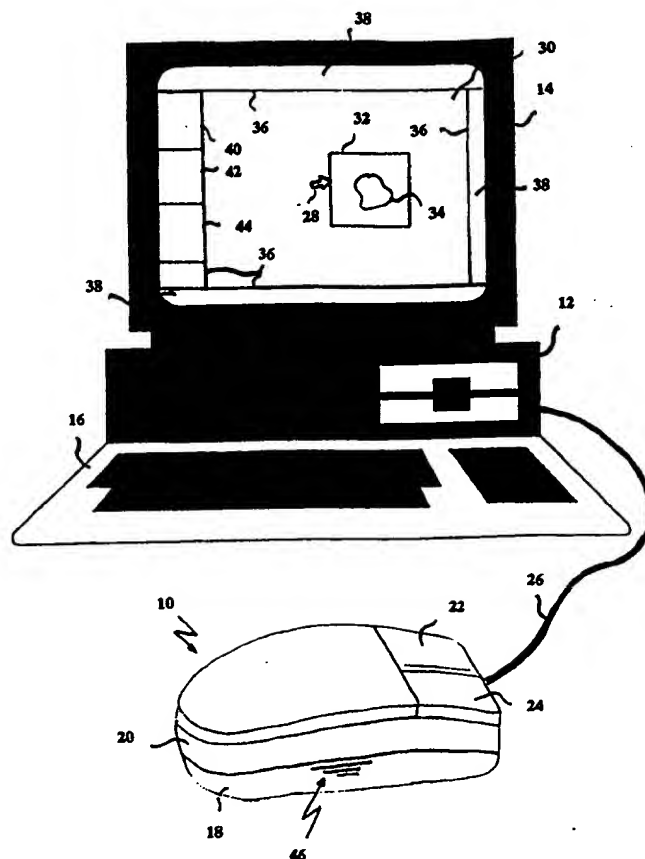
According to the arguments stated above, the invention claimed in claims 7-8 and 15-16 is novel and considered to involve an inventive step and to comprise industrial applicability.

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶: G06K 11/18, G06F 3/033	A1	(11) International Publication Number: WO 97/31333 (43) International Publication Date: 28 August 1997 (28.08.97)
(21) International Application Number: PCT/SE97/00293 (22) International Filing Date: 21 February 1997 (21.02.97) (30) Priority Data: 9600686-1 23 February 1996 (23.02.96) SE (71)(72) Applicant and Inventor: TOMER, Shalit [SE/SE]; Kemigränd 16, S-907 31 Umeå (SE). (74) Agents: ONN, Thorsten et al.; AB Stockholms Patentbyrå, Zacco & Bruhn (publ), P.O. Box 23101, S-104 55 Stockholm (SE).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> <i>In English translation (filed in Swedish).</i>

(54) Title: DISPLAY ARRANGEMENT AND METHOD**(57) Abstract**

The invention relates to a tracking device (10) and a method for a sensory feedback to the tracking device (10), when a cursor (28) hits or passes the borders of a graphical detail (32, 34, 36, 40, 42, 44). In an alternative embodiment for marking graphical details (32, 34, 36, 40, 42, 44) it is achieved that the cursor (28) controlled by the tracking device (10) on a display is fixed within the borders of said details (32, 34, 36, 40, 42, 44), when the cursor hits the borders, the tracking device (10) receiving a sensory feedback (46). In an embodiment is indicated how the cursor (28) is released from the fixation. The invention provides especially cognitive, tactile and motoric advantages to the user of so-called window interfaces with key rows (40, 42, 44) and icons (34).



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Display arrangement and method

Technical field

The present invention relates to a tracking device and a method for a sensory feedback from a cursor status for a cursor with graphical details being scanned or passed in connection with a program or comprising it. More specifically the invention provides a signal to be generated for a sensory feedback generating a movement of the tracking device.

State of the art

The user interface in form of a window (Window¹) as a facility to access special program functions in a data program is found in almost every modern interface. The program basing on the use of windows comprises also function keys in e.g. key rows, screen and display delimiters and icons, so-called graphic symbols.

To achieve access to the functions contained in the symbols a cursor is controlled by means of a tracking device (computer mouse, trackball, pointer, etc.) over a display unit showing the symbols, the function of the symbol being produced by e.g. pressing a key with one or several touches.

A problem with the control of the cursor to effect the symbols arises when it is difficult to fix the cursor to the symbol in a distinct way to let the touches have the desired effect.

It is easier to hit e.g. keys situated at the edge of a display than one in its centre. To hit a key at the edge the computer mouse is pulled quickly in the right direction to reach the key. It has no importance if the computer mouse is pulled too far. The cursor will anyhow stop at the edge. To hit a key situated e.g. in the centre of the display frame more coordination is however required by a user of the computer mouse to hit the target, thus, the user must e.g. slow down the tracking device before the key is reached to let the cursor land on the key. This step takes time and might be difficult and might even give the user stress and irritation.

A further problem, which is related to the use of tracking devices for said object, is that the user requires a simultaneous feature, i.e. to e.g. quickly localize the key for the memorizing function in a program without necessarily having to let the eye scan the display unit.

In the european patent application EP-A1-0,607,580 a computer mouse with a pin is described receiving signals from a host computer unit effecting the pin which generates

sensory signals to a users finger top e.g. when the cursor status is altered.

The invention according to said EP-application is, however, not without problems in that a finger top must be kept in contact with the pin. Ergonomic studies have shown that the user of a computer mouse when continuously using the computer mouse hardly can keep the finger tops over the same spot over a longer period of time. This is easily understood by ordinary people as some users are easily seized with cramp, writing cramps being a well known complaint. Furthermore, some people suffer from a lighter or heavier trembling. Thus the computer mouse with a pin is restricted in its use for a not negligible part of the users of tracking devices.

10

Summary of the invention

The present invention intends to solve above mentioned problems related to a window interface and similar in a new and innovative manner.

To achieve said object of the invention it is for marking graphical details in connection with or comprised in the program proposed a tracking device as a user interface for the access of program functions comprised in the details.

15

A cursor as a tracking device controlling on a display receives a sensory feedback from status signals for a user of the cursor in a host unit, when the cursor hits or passes said graphical details, in such a way that means arranged in the tracking device generate a movement of the tracking device.

20

The movement of the tracking device consists of that it vibrates, bounces, bumps or slants.

The cursor might be fixed within the limits of optional details, even three-dimensional ones, when the cursor hits the limit or passes it and the cursor is thus released by pushing the tracking device mantle downwards.

25

A graphical detail might be an icon, a key, a window or a border limiting the window.

Alternatively, graphical details in form of key rows provide various sensory feedback depending on the key and its function.

In a further alternative the cursor being fixed within a detail, is free to move within the borders of the detail.

30

The cursor, being fixed within a three-dimensional object or detail, is possibly free to move within the volume of the object or the detail in an embodiment with the cursor

possibly generating a shadow within the object or the detail when drawn out of these without first having been released. The shadow allows that the cursor can be moved more easily into the object or the detail. The invention comprises even a method for marking graphical details by means of a tracking device.

5

Brief description of the drawing

The invention will be described here below more in detail with reference to the attached figures of the drawings, where

10 **Figure 1** schematically illustrates a tracking device in form of a computer mouse connected to a host computer unit with a display showing graphical details and a sensory feedback to the computer mouse according to the invention,

Figure 2 schematically illustrates an alternative sensory feedback in a tracking device according to figure 1,

Figure 3 schematically illustrates a pressing of the tracking device according to figure 1 in an embodiment of the invention,

15 **Figure 4** schematically illustrates in an exploded view of the computer mouse an embodiment of how a means might be arranged in the computer mouse to achieve a movement of the computer mouse,

20 **Figure 5** schematically illustrates how a cursor with a shadow is shown, when the user of the cursor touches a tracking device in a three-dimensional environment according to an embodiment of the invention.

Detailed description of preferred embodiments

The present invention is here described more in detail with alternative embodiments illustrating the technology of the invention and the cognitive, tactile and motoric advantages provided by a tracking device according to the invention.

25 **Figure 1** illustrates schematically a computer mouse 10 connected to a host unit 12 in form of a computer, here a PC, with a display unit 14 and a key board 16.

The present invention with its embodiments specifically describes a computer mouse 10, the invention is however generally applicable to a majority of already known tracking devices such as track balls for portable computers, pointers, etc.

30

The computer mouse 10 consists of a casing 20 movable in relation to a bottom portion 18 and the conventional function keys 22, 24. Furthermore, the computer mouse is connected to a host unit 12, 14, 16 by means of a signal cable 26 comprising signal lines for

a track balls, here not shown, transmitters in the x and y-direction. Furthermore, the signal cable comprises lines for transmitting status signals for the cursor 28 from a cursor controller comprised in the host unit 12, 14.

The display 14 shows schematically in its frame 30 how the interface might be in a window environment. The frame 30 besides the display cursor 28 a window 32, an icon 34, a display border 36, a line of three keys 40, 42, 44 and three areas with special attributes not to be described in detail.

When the cursor 28 by means of the computer mouse 10 is moved towards or over the periphery 32, 34, 36, 40, 42, 44 of a graphical detail the host unit 12, 14 in one embodiment of the invention generates by means of the cursor controllers status (x- and y-coordinates, status flags, etc.) for the cursor 28 a sensory feedback in form of a signal by means of signal lines in the cable 26. The signal provides that a means arranged in the computer mouse 10 generates a movement of the computer mouse 10, e.g. in a form that the computer mouse vibrates, bounces, bumps, slants, etc.

In an alternative embodiment even the cursor 28 is fixed within the borders, but preferably in such a way, that it is free to move between the borders, e.g. between the borders 32 and 34 for the window and the icon, respectively, if it is fixed within the window.

In fixing the cursor 28 within a graphical detail the status register for the cursor 28 is initiated that a signal is sent to the computer mouse 10 with its casing 20 receiving a sensory feedback in that the cursor 28 has been fixed within or to a graphical detail 32, 34, 36, 40, 42, 44. In the present embodiment the casing 20 vibrates 46 in relation to the bottom portion 18. The complete computer mouse might eventually vibrate in an embodiment without any specific casing and specific bottom portion. A tracking device 10 might instead of vibrating bounce or bump each time the cursor is moved towards or fixed onto a graphical detail.

The vibrations can be achieved by means of devices such as electromagnets, piezoelectric transmitters, composite metals and other devices available in the market possibly achieving vibrations.

Furthermore, the graphical detail, in which the cursor 28 has been fixed, might in another embodiment be identified by means of the vibration frequency. In most cases it is quite sufficient that a few graphical details are to be identified by means of the vibration frequency, e.g. by means of an enter key, here designates 40, so that a simultaneous effect

is achieved in that e.g. a program or a data file has to be entered. This is achieved without the user necessarily sweeping or drifting with his eyes over the frame 30 to find the enter key 40. In principle most graphical details might, however, be provided with a specific code by means of the vibration frequency.

5 The cursor 28 being fixed within a frame it must be possibly released from this fixation. According to an embodiment of the present invention this is achieved in that the computer mouse 10 or any other used tracking device is exerted to a pressure downwards effecting a signal transmitter, e.g. a pressure transmitter, to change the status of the cursor 28, the user then feeling as if it presses out the cursor or is diving under the edge of the
10 border, thus improving the perception of the process on the frame 30. In feeling that the cursor is sliding over e.g. a key 40 the picture of the key 40 is elucidated. In a similar way the picture of a window 32 is intensified.

A parallel to the present invention is the introduction of shadows in graphical interfaces. In that the user can see the shadow of an interface, such as a window, it becomes
15 much easier to understand the concept with several layers in windows, i.e. windows overlapping each other. This provides a three-dimensional effect and improves the aesthetic aspect and provides even an improvement of the users perception of the interface rendering it more effective. The present invention achieves similar features which provides the parallelism.

In figure 2 is shown another embodiment of a sensory feedback according to the
20 invention.

Figure 2 schematically illustrates the computer mouse 10, the casing 20 being movable in relation to the bottom portion 18, slants to the right in the figure. marked by a downwards pointing arrow as a sensory feedback from the status register of the cursor 28. The slanting might even be achieved forwards, backwards, to the left, etc. Thus, the
25 corresponding slanting indicates a code. The slanting to the right might e.g. imply the key for the entering function 40. In the same way, the other slanting positions might indicate the code for another graphical detail 32, 34, 36, 40, 42, 44. Furthermore, alternating slanting positions for a feedback might indicate further codes.

Means for slanting the computer mouse 10 might consist of electromagnets, relays,
30 etc.

To leave a fixation within the limited area of a graphical detail or its periphery it is illustrated in figure 3. how the casing of the computer mouse 10 is pressed against the

bottom portion 18. a pressure transmitter e.g. generating a signal to the cursor 28 to leave a limited area, where it previously had been fixed. As already mentioned the computer mouse 10, with the casing 20 and the bottom portion forming together a unit. even by means of a convenient arrangement is provided with a pressure transmitter to achieve signals releasing the cursor 28.

Regarding the arrangement of means adapted to generate the sensory feedback in a tracking device it is preferably design precautions for the man of the art, but with reference to figure 4 an embodiment is exemplified how the means might be arranged within a computer mouse 10.

Figure 4 illustrates, how an electromagnet 50 by means of screws is arranged in a means of attachment 52, here fixed by means of screws in the bottom portion 18 of the computer mouse 10. Between the casing 20 and the bottom portion 18 a resilient means 56 is placed. When the computer mouse 10 receives the sensory feedback signal the anchor 58 of the electromagnet 50 hits the casing 20 generating a movement in the casing 20. The movement transforms into a vibration by means of the potential energy stored in the resilient means 56. To achieve a coding of the sensory feedback as described above already known means generating pulse sequences might be used.

Moreover, the present invention solves the problems connected to the sensory feedback by means of a pin as described in EP-A1-0-607,580 in that the mouse itself vibrates making it easier for the user with a tendency to be seized with cramp and trembling to use the computer mouse 10. They do not necessarily have to touch the computer mouse with any specific position of the hand as the whole computer mouse according to the invention is moving.

Figure 5 illustrates how a cursor with a shadow is shown, when according to one embodiment of the present invention a user of the cursor touches a tracking device in a three-dimensional virtual surrounding 60, e.g. a space.

The tracking device 10 is moved to a desired virtual object 62 in form of a three-dimensional volume without the object being visible in space. However, the cursor 28 controlled by the pointer might be followed on a display means delimited by means of the solid line 64. The display means is not necessarily a computer screen 30 but may consist of any other form of picture reproduction means, e.g. a mirror.

The object 62 is visible to a user on the display means delimited by the line 64 in

figure 5, i.e. not virtually as the surroundings 60.

Moreover, the cursor 28 has a shadow 66 on the display means 64 remaining within the object. when the cursor is pulled out of the object, if the tracking device is not released by means of e.g. a pressing downwards. A user of the tracking device finds in some way
5 easier back to the object 62 in the virtual surroundings after e.g. a pause or another exit from the space of the object 62. The cursor is then integrated with the shadow when it is situated in the object 62.

The facts mentioned above are e.g. applicable in CAD programs such as ALIAS* i.a. being used in the car industry to design products, where it is a problem to decide, where in
10 the space depth the cursor 28 is situated. It should also be observed that the virtual space 60 may comprise numbers of space objects 62 in various geometric forms, the usefulness of the shadow 66 becoming obvious.

The depth of a space object 62 is e.g. defined by means of a coordinate system 68 in three dimensions, such as a cartesian or a polar system, etc.

15 Another possible application area for the embodiment above of the cursor 28 with a shadow 66 is in surgery field, e.g. for training of surgical candidates or for more advanced surgery of more or less complicated operations.

A three-dimensional picture or a picture in perspective consists conventionally of a program providing mesh models of objects 62 without any space therein. The space might
20 be calculated in real time when a surface is passed in the object 62. Thus, a surface in the object 62 is defined by means of here not shown polygons rendered in real time, the necessary surface to obtain space thus being obtained.

The present invention has been described with preferred embodiments not to be considered to limit the invention. It is the definition of the claims that defines the invention
25 for the man of art.

Claims:

1. A tracking device for marking graphical details (32, 34, 36, 40, 42, 44) in connection with or comprised in a program as an interface for the access of program functions comprised in the details, **characterized in** that a cursor (28) controlled by means
5 of the tracking device (10) on a display receives a sensory feedback from status signals for a cursor control in a host unit (12, 14, 30), when the cursor hits or passes said graphical details (32, 34, 36, 40, 42, 44) in such a form that means (50) provided in the tracking device (10) generate a movement (46) of the tracking device (10), where a cursor (28) being fixed in a detail can freely move within the borders of the detail (32, 34, 36, 40, 42, 44).
- 10 2. A tracking device according to claim 1, **characterized in** that the movement of the tracking device consists of that it vibrates, bounces, bumps or slants.
3. A tracking device according to claim 1 to 2, **characterized in** that the cursor can be fixed within the borders of optional details (32, 34, 36, 40, 42, 44), when the cursor (28) hits the borders or passes them and when the cursor is released during a pressing-down of
15 the casing (20) of the tracking device.
4. A tracking device according to claim 1 to 3, **characterized in** that a graphical detail can consist of an icon (34), a key (40, 42, 44), a window (32) or an edge (36) delimiting the frame (30).
5. A tracking device according to claim 1 to 4, **characterized in** that graphical
20 details in form of key rows are rendering different sensory feedbacks depending on the key and its function.
6. A tracking device according to claim 1 to 5, **characterized in** that the cursor (28) being fixed in a three-dimensional object or detail is free to move within the volume of the object or the detail.
- 25 7. A tracking device according to claim 3 to 5, **characterized in** that the cursor (28) provides a shadow within the object or the detail if drawn out of these without first being released.
8. A tracking device according to claim 7, **characterized in** that the shadow allows the cursor to be moved more easily into the object or the detail.
- 30 9. A method for marking graphical details (32, 34, 36, 40, 42, 44) in connection with or comprised in a program as an user interface for the access of program functions comprised in the details, **characterized in** that a cursor (28) controlled by means of the

tracking device (10) on a display receives a sensory feedback from status signals for a cursor control in a host unit (12, 14, 30) when the cursor hits or passes said graphical details (32, 34, 36, 40, 42, 44) in such a form that means (50) provided in the tracking device (10) generate a movement (46) of the tracking device (10), where a cursor (28) being fixed in a detail can freely move within the borders of the detail (32, 34, 36, 40, 42, 44).

10. A method according to claim 9, characterized in that the movement of the tracking device consists of that it vibrates, bounces, bumps or slants.

11. A method according to claim 9 to 10, characterized in that the cursor can be fixed within the borders of optional details (32, 34, 36, 40, 42, 44), when the cursor (28) hits the borders or passes them and when the cursor is released during a pressing-down of the casing (20) of the tracking device.

12. A method according to claim 9 to 11, characterized in that a graphical detail can consist of an icon (34), a key (40, 42, 44), a window (32) or an edge (36) delimiting the frame (30).

13. A method according to claim 9 to 12, characterized in that graphical details in form of key rows are rendering different sensory feedbacks depending on the key and its function.

14. A method according to claim 9 to 13, characterized in that the cursor (28) being fixed in a three-dimensional object or detail is free to move within the volume of the object or the detail.

15. A method according to claim 9 to 14, characterized in that the cursor (28) provides a shadow within the object or the detail if drawn out of these without first being released.

16. A method according to claim 15, characterized in that the shadow allows the cursor to be moved more easily into the object or the detail.

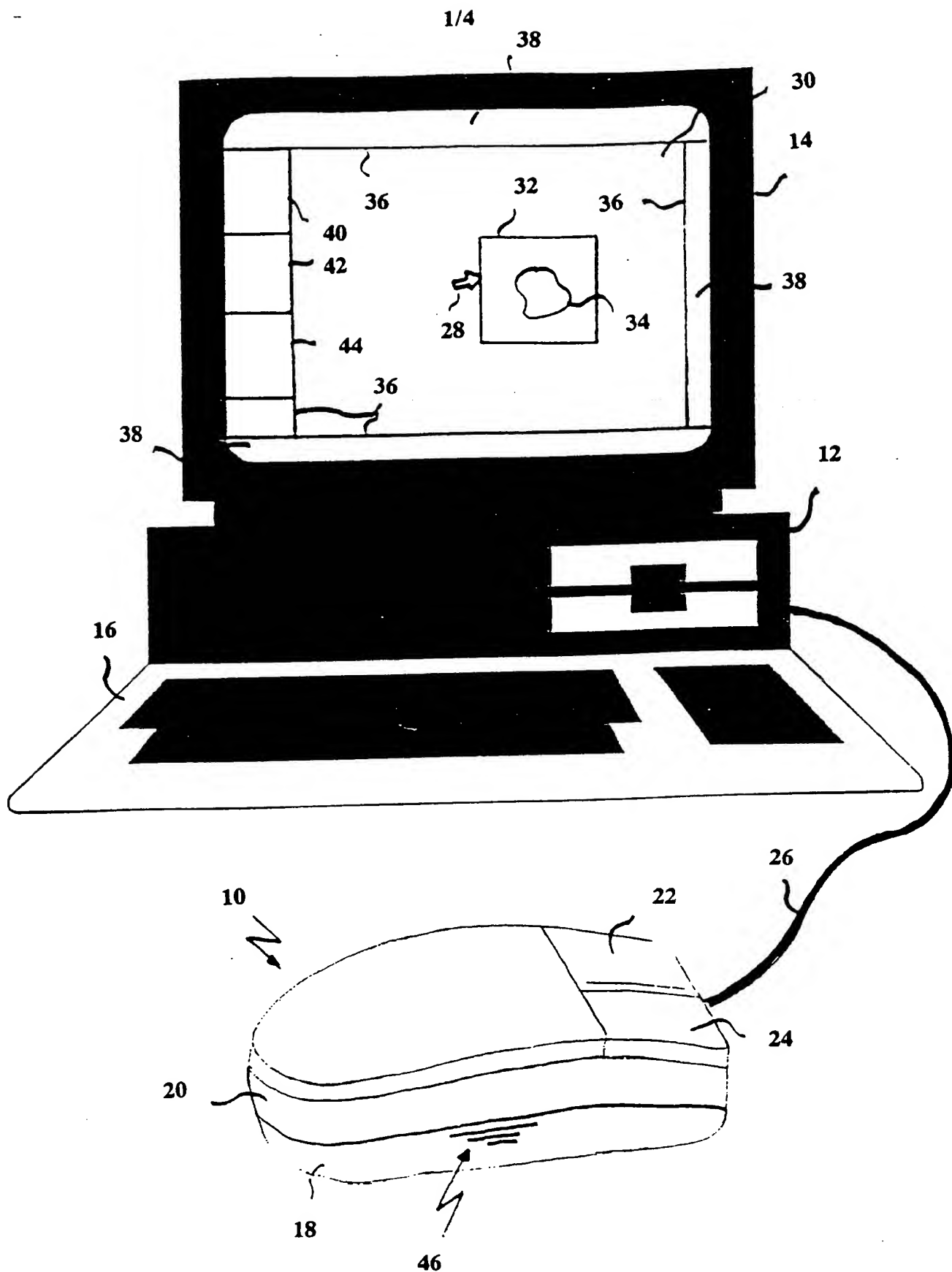


Fig. 1

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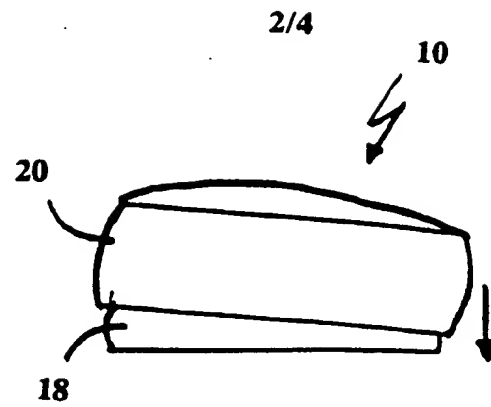


Fig. 2

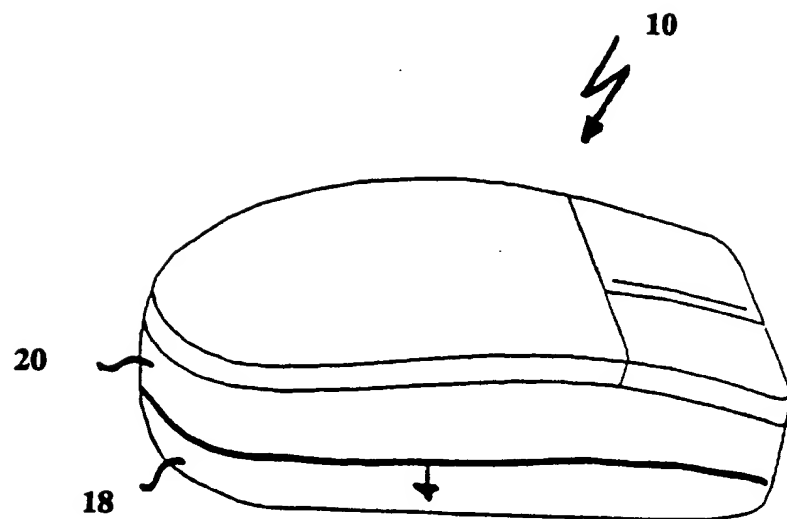


Fig. 3

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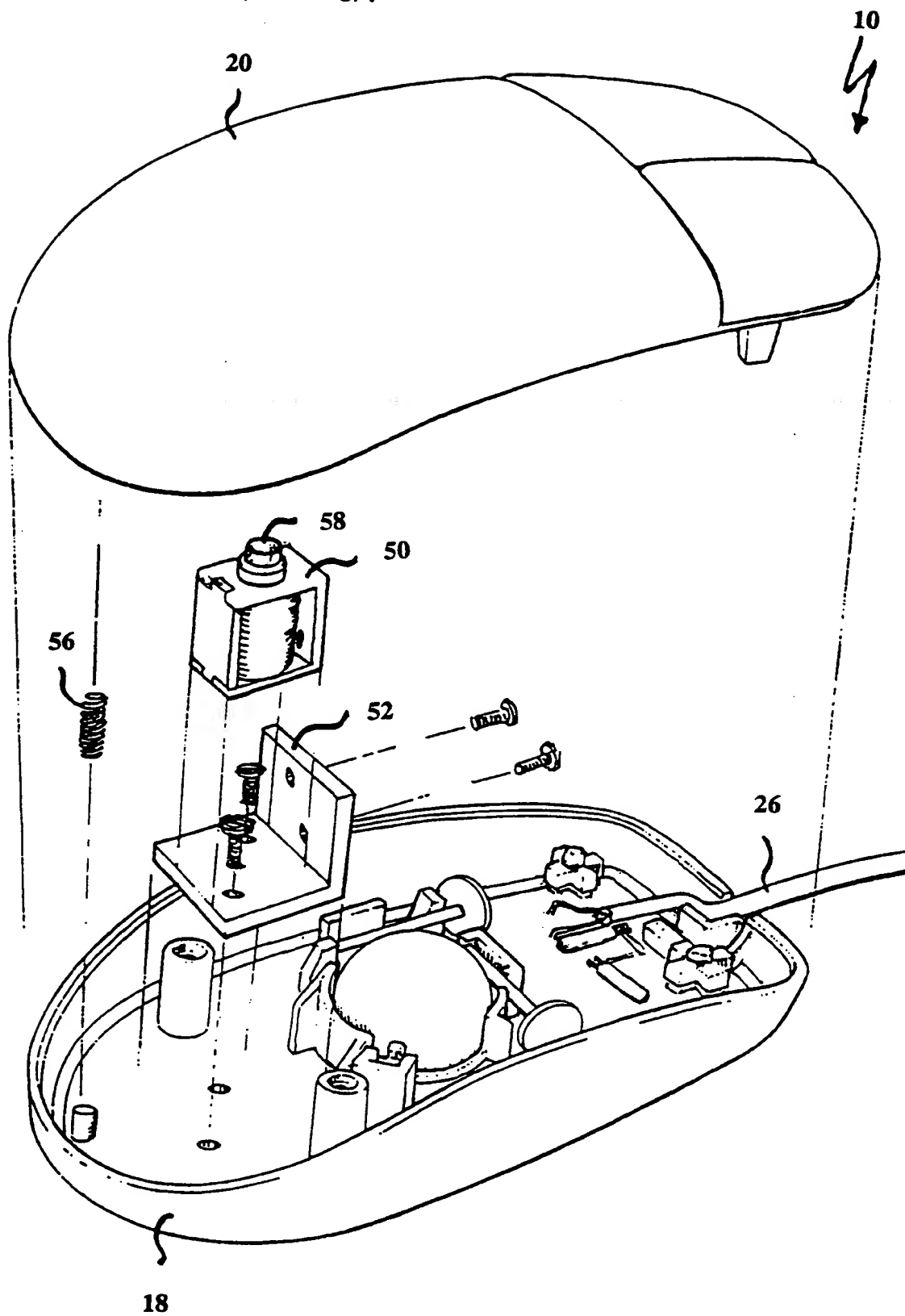


Fig. 4
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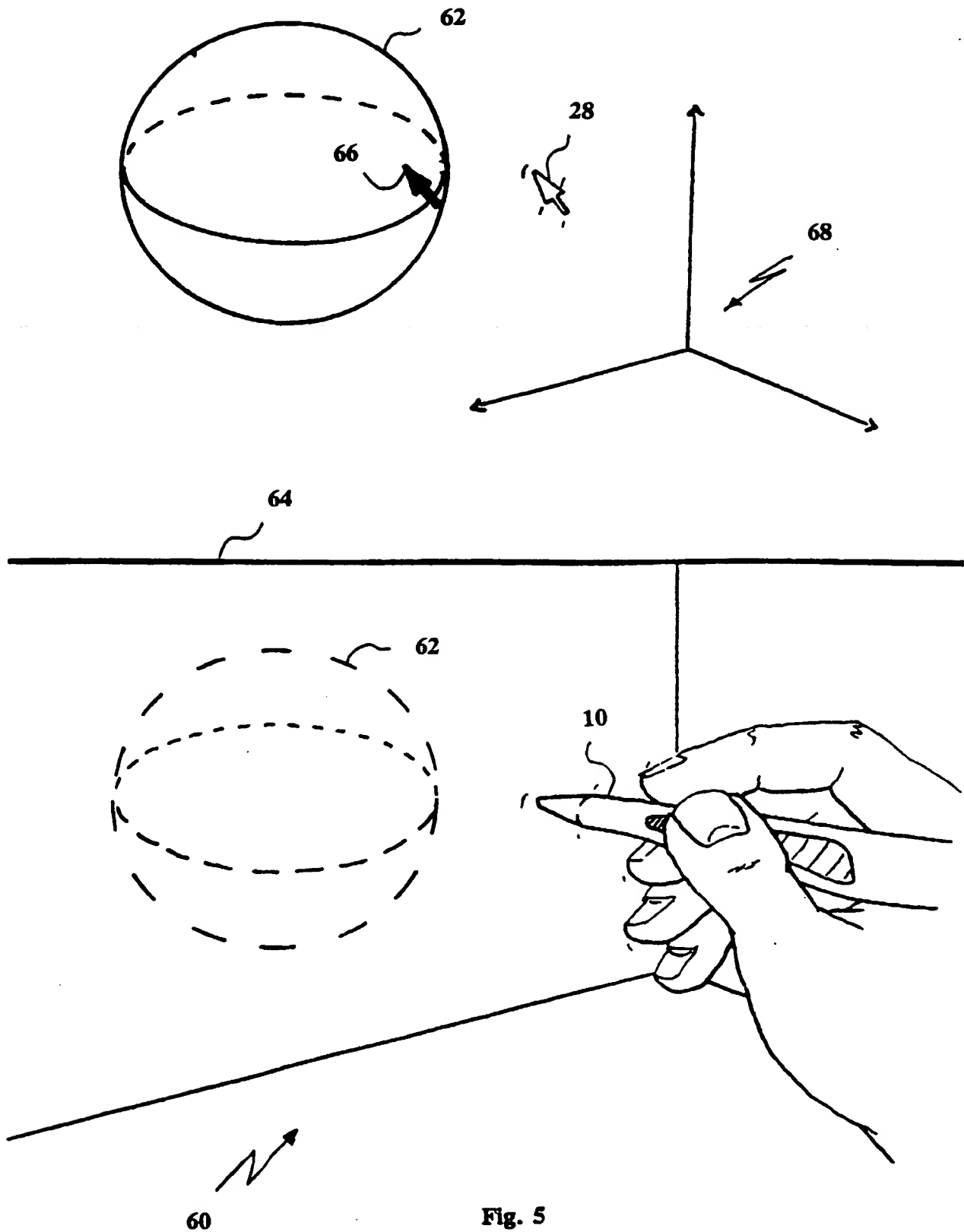


Fig. 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 97/00293

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: G06K 11/18, G06F 3/033

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: G06K, G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EDOC, WPI

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☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

9 July 1997

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 97/00293

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Information on patent family members

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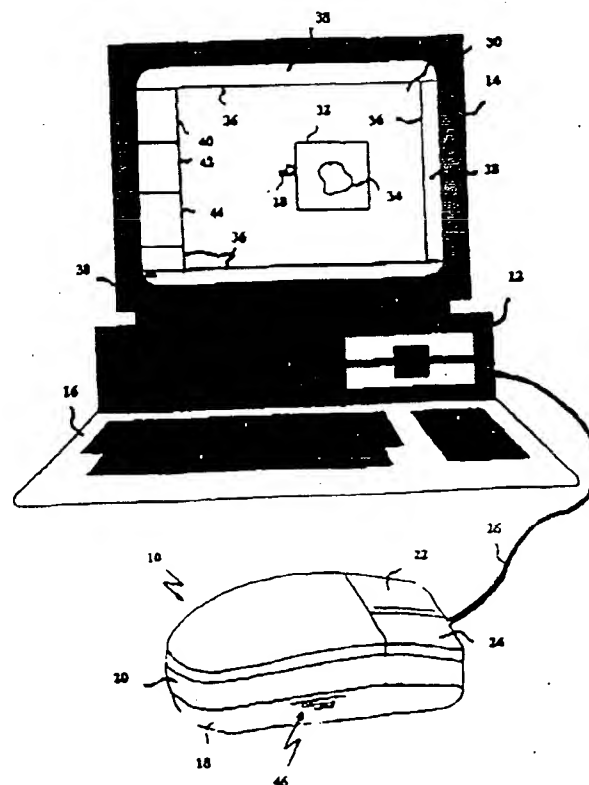
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(74) Agents: ONN, Thorsten et al.; AB Stockholms Patentbyrå, Zacco & Bruhn (publ), P.O. Box 23101, S-104 55 Stockholm (SE).		<p>Published</p> <p>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments. In English translation (filed in Swedish).</p>	

(54) Title: **DISPLAY ARRANGEMENT AND METHOD**

(57) Abstract

The invention relates to a tracking device (10) and a method for a sensory feedback to the tracking device (10), when a cursor (28) hits or passes the borders of a graphical detail (32, 34, 36, 40, 42, 44). In an alternative embodiment for marking graphical details (32, 34, 36, 40, 42, 44) it is achieved that the cursor (28) controlled by the tracking device (10) on a display is fixed within the borders of said details (32, 34, 36, 40, 42, 44), when the cursor hits the borders, the tracking device (10) receiving a sensory feedback (46). In an embodiment is indicated how the cursor (28) is released from the fixation. The invention provides especially cognitive, tactile and motoric advantages to the user of so-called window interfaces with key rows (40, 42, 44) and icons (34).



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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 97/00293

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: G06K 11/18, G06F 3/033

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: G06K, G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EDOC, WPI

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X	column 1, line 54 - line 58; column 2, line 1 - line 9	3,11
Y	EP 0265011 A1 (OCE-NEDERLAND B.V.), 27 April 1988 (27.04.88), column 1, line 1 - line 5; column 1, line 47 - line 53; column 2, line 1 - line 2	1,9
Y	EP 0489469 A1 (N.V. PHILIPS' GLOEILAMPENFABRIEKEN), 10 June 1992 (10.06.92), column 2, line 1 - line 10; column 8, line 2 - line 19, figure 5	1,9

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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X	page 2, line 10 - line 18; page 2, line 24 - line 27 --	2,4,5,10,12, 13
A	US 4868549 A (FRANK J. AFFINITO ET AL), 19 Sept 1989 (19.09.89), abstract --	1,9
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Information on patent family members

01/07/97

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